

SHORT NOTE

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Synthesis of the silky sifaka's distribution (*Propithecus candidus*)

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In this paper we 1) review the population abundance and distribution of *Propithecus candidus*, 2) comment on Rabearivony et al. (2015) and Rasolofoson et al. (2007) regarding *P. candidus* elevational range, distribution, and lack of occurrence in the pet trade.

ABUNDANCE

Silky sifakas (*Propithecus candidus*) have long been recognized as one of the rarest and most unique lemurs (Mittermeier et al., 2010). Although not albinos, they are a leucistic species exhibiting more skin depigmentation with age than perhaps any other non-human primate. This may be caused by a vitiligo-like skin condition (Linder 2013 In litt.). They are one of the largest bodied lemurs and generally inhabit high montane habitats up to 1875m, higher than any other sifaka or Indriid (Patel 2014). Tragically, there are currently believed to be less than 2000 individuals remaining in a small region of northeastern Madagascar (Mittermeier et al. 2010, Patel 2014). Group encounter rates from a line-transect survey in northern Marojejy National Park (NP) in 2007 are extremely low at 0.015 groups/km² (Loudon et al. 2016). Recent density estimates from rapid surveys conducted by ERP, in Anjanaharibe-Sud Special Reserve (SR) in 2015 are also extremely low at 1.9 individuals (indiv.)/km² (north-east near Ambodisatrana) and 0.29 indiv./km² (central-east near Camp Indri), though higher in the western extension at 2.59 indiv./km² (south-west near Ampoanaomby). These density estimates are considerably lower than most other eastern sifakas such as *P. edwardsi* (~4.73 indiv./km²; Wright et al., 2012), *P. diadema* (~7.3 indiv./km², Irwin 2008), but similar to extremely rare *P. perrieri* (~3.1 indiv./km², Banks et al. 2007) which shows the smallest distribution of all sifaka species. By comparison, western sifakas have even larger densities: *P. tattersalli* (~34 to 90 indiv./km², Quéméré et al. 2010), *P. coquereli* (5 to 93 indiv./km², Kun-Rodrigues et al. 2014), *P. coronatus* (49 to 309 indiv./km², Salmona et al. 2013), *P. verreauxi* (41 to 1036 indiv./km², Norscia and Palagi 2008).

The remaining *Propithecus candidus* population is declining due to hunting; there is no taboo or fady protecting them (Patel et al. 2005, Jenkins et al. 2011, Golden and Comaroff 2015, Loudon et al. 2016); habitat disturbance from slash-and-burn agriculture and selective logging for rosewood, ebony, and other hardwoods

(Patel 2007), as well as artisanal mining. Although, they have long been known to inhabit Marojejy NP, Anjanaharibe-Sud SR, as well as the Makira Natural Park; until recently there has been little information on their occurrence in COMATSA (Corridor Marojejy–Anjanaharibe-Sud–Tsaratanana). Goodman et al. (2003) first observed *P. candidus* at two sites (820m and 1200m of elevation) on the western side of the Betaolana Corridor between Marojejy and Anjanaharibe-Sud (Figure 1, Table S1).

Rabearivony et al. (2015) report an impressive biodiversity survey in the COMATSA corridor which connects Marojejy NP, Anjanaharibe-Sud SR, and the Tsaratanana Strict Nature Reserve. The COMATSA corridor is a large continuous forest block covering ap-

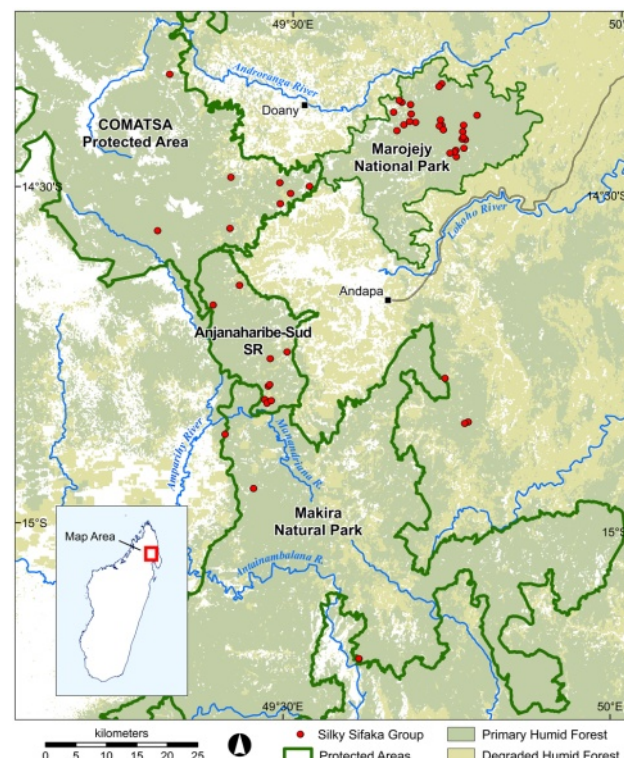


Figure 1. Location of known *Propithecus candidus* groups in northeastern Madagascar (Data for map available in Table S1). Each red dot represents a different silky sifaka group (not sightings of all encounters). Within Marojejy National Park and Anjanaharibe-Sud Special Reserve, more groups are expected to be found between 650m and 1950m of elevation. Map by Paul Atkinson.



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proximately 250,000 hectares including a wide elevational range from 75m to 2800m of altitude. It is humid forest with approximately 2500mm of rainfall annually. Although it has received provisional protected area status through WWF since 2010, it was not yet confirmed as a new protected area in February 2016. During this survey, 248 vertebrate species were observed including the Critically Endangered *Propithecus candidus*. Importantly, Rabearivony et al. (2015) provide the first observations of *P. candidus* from the Anjiabe and Antsahabe sites. The Anjiabe site (hosting a likely small and isolated population of *P. candidus*) is particularly remarkable and represents the northernmost location for the species outside of Marojejy (Figure 1). However, both of these sites are still south of the Androranga River, which still remains the northern limit for the species (Figure 1, Table S1, Patel 2014).

CORRECTION TO RABEARIVONY ET AL. (2015)

A few minor corrections need to be made to Table 1 and to Supplementary file #4 of Rabearivony et al. (2015). The authors report that the elevational range of *Propithecus candidus* is from 775m to 1625m but the known elevational range for the species is from 235m in Makira at the Andaparaty Rabeson site (Rajaonarison and Patel 2013, Rajaonarison 2015) to 1875m in Marojejy (Sterling and McFadden 2000). Furthermore, the authors also report, without providing evidence, that *P. candidus* has been kept in captivity as a pet and that it is threatened by the pet trade. Although Reuter et al. (2014) estimated that ~28,000 lemurs may have been kept as pets in Madagascar since 2010, no *P. candidus* have yet been observed as pets (Mittermeier et al. 2010, Patel 2014). Indeed, *P. candidus*, like other sifakas (such as the *P. diadema* and *P. tattersalli* which lived at Duke Lemur Center, but have not survived), are likely to be extremely difficult to raise in captivity due to their highly specialized diet. Although recent seasonal dietary (Sato et al. 2016) and nutritional analyses (Ganzhorn et al. 2016) offer some new insights, *P. candidus* has never been kept in captivity, and none are found in any zoos anywhere in the world (IUCN 2015).

CORRECTION TO RASOLOFOSON ET AL. (2007)

A minor correction is also warranted to the lemur survey paper of Rasolofoson et al. (2007). These authors observed *Propithecus candidus* at two sites: (i) Manandriana (research camp location: E049°27'37.3", S14°49'53.3") which is just north of the Manandriana River and (ii) Anjanaharibe (Andaparaty research camp location: E049°36'50.8", S15°11'17.1") which is just north of the Antainambalana River. These were important discoveries, as *P. candidus* had never before been observed at the Manandriana site, and were only rumored to be present at the Anjanaharibe (Andaparaty) site. At the time of publication, the boundaries of Makira were not yet fully demarcated, and the Manandriana site was believed to be inside the Makira Natural Park. In 2015, the Anjanaharibe-Sud SR was extended, and it is now clear that the *P. candidus* found at the Manandriana site are actually inside Anjanaharibe-Sud SR. These corrections impact the population management of this species and are addressed to the Wildlife Conservation Society that manages the Makira Natural Park and to Madagascar National Parks which manages Anjanaharibe-Sud SR.

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SUPPLEMENTARY MATERIAL.

Available online only.

Figure S1: Location of known *Propithecus candidus* groups in northeastern Madagascar.

Table S1: Coordinates, localities, dates, and sources for *Propithecus candidus* records used in Figure S1.

Document S1: Rajaonarison and Patel 2013

Document S2: Rajaonarison 2015